

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

- 1 1. (Currently Amended) A current-perpendicular-to-plane (CPP)
2 GMR/tunnel valve (TV) sensor, comprising:
3 a sensor stack having a free layer forming an active area;
4 a spacer layer formed over a top surface of the free layer of the sensor stack;
5 a biasing layer disposed ~~over~~ on and in contact with a top surface of the spacer;
6 and
7 a high coercivity layer formed without contact with the biasing layer and adjacent
8 the sensor stack for pinning the biasing layer, the biasing layer maintaining a direction of
9 magnetization in the free layer until influenced by a readback field.
- 1 2. (Original) The CPP GMR/ TV sensor of claim 1, wherein the high
2 coercivity layer comprises an $\alpha\text{-Fe}_2\text{O}_3$ layer.
- 1 3. (Original) The CPP GMR/ TV sensor of claim 1 further comprising a
2 seed layer disposed over the high coercivity layer and a coupling layer disposed over the
3 bias layer and the seed layer.
- 1 4. (Original) The CPP GMR/ TV sensor of claim 3, wherein the seed
2 layer comprises a NiFe seed layer, the high coercivity layer comprises an $\alpha\text{-Fe}_2\text{O}_3$
3 layer formed adjacent the sensor stack in a passive area and the coupling layer comprises
4 NiFe layer.

1 5. (Original) The CPP GMR/ TV sensor of claim 1, wherein the sensor
2 stack comprises a pinned layer, a spacer layer and the free layer.

1 6. (Original) The CPP GMR/ TV sensor of claim 5, wherein the pinned
2 layer comprises a first CoFe layer, a Ru layer and a second CoFe layer.

1 7. (Currently Amended) The CPP GMR/ TV sensor of claim 5, wherein the
2 free layer comprises an a-CoFe/NiFe alloy layer comprising CoFe and NiFe.

1 8. (Original) The CPP GMR/ TV sensor of claim 5, wherein the sensor
2 stack further comprises a sensor stack seed layer, the pinned layer being formed on the
3 seed layer.

1 9. (Original) The CPP GMR/ TV sensor of claim 8, wherein the sensor
2 stack seed layer comprises a NiFeCr layer, a NiFe layer and a PtMn layer.

1 10. (Currently Amended) The CPP GMR/ TV sensor of claim 1, wherein the
2 bias layer is pinned ~~attains pinning~~ by exchange coupling between the bias layer ~~in the~~
3 ~~active area and passive areas~~ and the high coercivity layer.

1 11. (Currently Amended) A magnetic storage system, comprising:
2 a magnetic storage medium having a plurality of tracks for recording of data; and
3 a CPP GMR/ TV sensor maintained in a closely spaced position relative to the
4 magnetic storage medium during relative motion between the magnetic transducer and
5 the magnetic storage medium, the CPP GMR/ TV sensor further comprising:
6 a sensor stack having a free layer forming an active area;
7 a spacer layer formed over a top surface of the free layer of the sensor stack;
8 a biasing layer disposed ~~over~~ on and in contact with a top surface of the spacer;
9 and
10 a high coercivity layer formed without contact with the biasing layer and adjacent
11 the sensor stack for pinning the biasing layer, the biasing layer maintaining a direction of
12 magnetization in the free layer until influenced by a readback field.

1 12. (Original) The CPP GMR/ TV sensor of claim 11, wherein the high
2 coercivity layer comprises an α -Fe₂O₃ layer.

1 13. (Original) The CPP GMR/ TV sensor of claim 11 further comprising a
2 seed layer disposed over the high coercivity layer and a coupling layer disposed over the
3 bias layer and the seed layer.

1 14. (Original) The CPP GMR/ TV sensor of claim 13, wherein the seed
2 layer comprises a NiFe seed layer, the high coercivity layer comprises an α -Fe₂O₃
3 layer formed adjacent the sensor stack in a passive area and the coupling layer comprises
4 NiFe layer.

1 15. (Original) The CPP GMR/ TV sensor of claim 11, wherein the sensor
2 stack comprises a pinned layer, a spacer layer and the free layer.

1 16. (Original) The CPP GMR/ TV sensor of claim 15, wherein the pinned
2 layer comprises a first CoFe layer, a Ru layer and a second CoFe layer.

1 17. (Currently Amended) The CPP GMR/ TV sensor of claim 15, wherein the
2 free layer comprises an a-CoFe/NiFe alloy layer comprising CoFe and NiFe.

1 18. (Original) The CPP GMR/ TV sensor of claim 15, wherein the sensor
2 stack further comprises a sensor stack seed layer, the pinned layer being formed on the
3 seed layer.

1 19. (Original) The CPP GMR/ TV sensor of claim 18, wherein the sensor
2 stack seed layer comprises a NiFeCr layer, a NiFe layer and a PtMn layer.

1 20. (Currently Amended) The CPP GMR/ TV sensor of claim 11, wherein the
2 bias layer is pinned attains pinning by exchange coupling between the bias layer ~~in the~~
3 ~~active area and passive areas~~ and the high coercivity layer.

1 21. (Original) A method for reducing the thickness of a sensor stack in a
2 current-perpendicular-to-plane (CPP) GMR/tunnel valve (TV) sensor, comprising:
3 forming a sensor stack seed layer;
4 forming, over the sensor stack seed layer, a sensor stack having a free layer, a
5 spacer and a pinned layer;
6 forming a spacer layer over the free layer of the sensor stack;
7 forming a biasing layer over the spacer; and
8 adjacent to the sensor stack, forming a high coercivity layer for pinning the bias
9 layer;
10 forming a passive area seed layer over the high coercivity layer;
11 forming a layer of Ta over the bias layer and the passive area seed layer;
12 removing the Ta layer even with the bias layer;
13 forming, over the bias layer and the passive area seed layer, a coupling layer for
14 pinning the biasing layer, the biasing layer maintaining a direction of magnetization in
15 the free layer until influenced by a readback field; and
16 forming a cap over the coupling layer.